



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---------------|----------------------|---------------------|------------------|
| 10/596,964 | 10/03/2007 | Qing Kelvin Lu | US040033US2 | 8970 |
| 24737 | 7590 | 10/27/2008 | EXAMINER | |
| PHILIPS INTELLECTUAL PROPERTY & STANDARDS | | | SONG, HOON K | |
| P.O. BOX 3001 | | | ART UNIT | PAPER NUMBER |
| BRIARCLIFF MANOR, NY 10510 | | | 2882 | |
| MAIL DATE | DELIVERY MODE | | | |
| 10/27/2008 | PAPER | | | |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/596,964 | LU ET AL. | |
| | Examiner | Art Unit | |
| | HOON SONG | 2882 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) Responsive to communication(s) filed on 15 July 2008.
 2a) This action is FINAL. 2b) This action is non-final.
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-22 is/are pending in the application.
 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
 5) Claim(s) _____ is/are allowed.
 6) Claim(s) 1-22 is/are rejected.
 7) Claim(s) _____ is/are objected to.
 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
 10) The drawing(s) filed on 10 January 2008 is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) All b) Some * c) None of:
 1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ . |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____. | 6) <input type="checkbox"/> Other: _____ . |

DETAILED ACTION***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dilick (US 6286998B1) in view of Herynek et al. (US 2004/0011305A1).

Regarding claim 1, Dilick teaches an assembly comprising:

an x-ray tube including:

an envelope which defines an evacuated chamber in which x-rays are generated;

a housing which surrounds at least a portion of the envelope;

a cooling system which circulates a coolant through the housing to remove heat from the x-ray tube, the cooling system including:

a pump (54).

However Dilick fails to teach a flow sensor system which is responsive to a pressure difference across the pump.

Herynek teaches a cooling system (76) having a flow sensor (34) which is responsive to a pressure difference across a pump (32).

It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the pump of Dilick with the flow sensor system (76 and 34) as taught by Herynek , since the sensor would provide better cooling fluid control.

Regarding claim 2, Herynek teaches the flow sensor system is electric sensor system 34.

Regarding claim 3, Richardson teaches the cooling system further includes:

a recirculating fluid flow path including a first fluid line which connects the housing with an upstream end of the pump and a second fluid line which connects a downstream end of the difference between the first fluid line and the second fluid line (figure 5).

Regarding claim 4, Herynek teaches the flow sensor system detects a first pressure upstream of the pump and a second pressure downstream of the pump.

Regarding claim 5, Herynek teaches a processor which receives a signal from the flow sensor system correlated with the pressure difference, the processor determining a flow rate of cooling fluid therefrom.

Regarding claim 6, Dilick as modified by Herynek teaches a control means 76, 34, the control means controlling operation of the x-ray tube in the event that the determined flow rate is below a preselected minimum level.

Regarding claim 7, Dilick as modified by Herynek teaches a control means responsive to the pressure difference controlling at least one of:

operating power of the x-ray tube; operating time of the x-ray tube; selectable scan protocols; and a cooling period prior to subsequent operating of the x-ray tube.

Regarding claim 8, Herynek teaches a temperature sensor (80) which senses a temperature of circulating coolant in at least one of the housing and the cooling system.

Regarding claims 9 and 21-22, Herynek teaches a processor 76 which receives signals from the temperature sensor and flow sensor system and determines an indication of thermal loading or remaining thermal capacity of the cooling system.

Regarding claim 10, Dilick as modified by Herynek teaches the processor determines a cooling period, based on the determined indication, x-ray tube power, operating time, and duty cycle of a planned scan protocol to ensure that the x-ray tube is capable of performing the planned protocol without overheating.

Regarding claims 11-12, Dilick teaches a CT system.

Regarding claim 13, Dilick teaches a method for controlling operation of an x-ray tube, the method comprising:

circulating a cooling fluid through a housing (202) and over the x-ray tube with a pump (308);

removing heat from the cooling fluid which has circulated through the housing; and determining a flow rate of the cooling fluid (paragraph 45).

However Dilick fails to teach the method of determining a pressure difference across the pump or a function which correlates with the pressure difference, and determining the flow rate from the pressure difference or function.

Herynek teaches a cooling system (76) having a flow sensor (34) which is responsive to a pressure difference across a pump (32).

It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the pump of Dilick with the flow sensor system (76 and 34) method as taught by Herynek , since the sensor would provide better cooling fluid control.

Regarding claim 14, Dilick as modified by Herynek teaches in the event that the flow rate drops below a predetermined minimum value, reducing power to the x-ray tube (paragraph 18).

Regarding claim 15, Herynek teaches determining a temperature of the cooling fluid (80).

Regarding claim 16, Herynek teaches determining a temperature difference (paragraph 17).

Regarding claim 17, Herynek teaches determining a thermal loading condition of the x-ray tube from the determined temperature and flow rate (paragraph 18).

Regarding claim 18, Dilick as modified by Herynek teaches in response to the determined thermal loading condition, controlling at least one of:

operating power of the x-ray tube; operating time of the x-ray tube; selectable scan protocols; and, a cooling time prior to subsequent operating of the x-ray tube.

Regarding claim 19, Dilick teaches a system for removing heat from an associated x-ray tube comprising:

a fluid flow path which carries a cooling fluid to at least a portion of the associated x-ray tube, and removes heat therefrom;

a pump (308) which circulates the cooling fluid through the fluid flow path; means (500 or paragraph 45) for determining a pressure difference across the pump.

However Dilick fails to teach means responsive to the determined pressure difference for controlling operation of the x-ray tube.

Herynek teaches a cooling system (76) having a flow sensor (34) which is responsive to a pressure difference across a pump (32).

It would have been obvious to one of ordinary skill in the art at the time of the invention to provide the pump of Dilick with the flow sensor system (76 and 34) as taught by Herynek , since the sensor would provide better cooling fluid control.

Regarding claim 20, Herynek teaches the determining means includes:
a means for measuring a pressure difference across the pump; and a means for
determining cooling fluid flow rate from the determined pressure difference (paragraph 45).

Response to Arguments

Applicant's arguments with respect to claims 1-22 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HOON SONG whose telephone number is (571)272-2494. The examiner can normally be reached on Monday - Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Glick can be reached on (571) 272 - 2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Hoon Song/

Primary Examiner, Art Unit 2882